

August 16, 2021

LEIBNIZ INSTITUTE FOR EXPERIMENTAL VIROLOGY (HPI)

Influenza during pregnancy predisposes offspring to increased susceptibility to infection

Results published in Nature Communications

Hamburg. The research department "Viral Zoonoses - One Health" at the Leibniz Institute for Experimental Virology (HPI) in Hamburg, headed by Prof. Gülşah Gabriel, professor at the University of Veterinary Medicine Hannover (TiHo), has used a new animal model to investigate whether offspring of influenza A virus-infected mothers are more susceptible to other infections later in life. The results have now been published in the renowned journal "Nature Communications".

Pregnant women are among the highest risk group for severe, sometimes fatal, influenza infections. Whether influenza contracted during pregnancy also affects the later health of the offspring was not known until now.

The study, now published in Nature Communications, uses a new *two-hit* mouse model to show that moderate influenza during pregnancy increases the offspring's susceptibility to infection from other viruses as well as bacteria, especially early in life.

The underlying mechanisms for this are diverse. Three factors in particular play an important role:

1. An influenza virus-induced immune activation in the lungs,
2. a low birth weight, and
3. a functional impairment of fetal alveolar macrophages to recognize and eliminate infections.

Key molecules that lead to this increased risk in the offspring of influenza-infected mothers, such as inflammatory cytokines in the mother's lungs, are also induced by other respiratory viruses (including SARS-CoV-2).

"From human studies, several independent indications already suggest that infants whose mothers had influenza during pregnancy are at increased risk of infection during their first months of life. Until now, these have been association studies. The findings in the new animal model now show for the first time that there is a clear causality here between the viral infection in pregnancy and the increased vulnerability of the offspring to infection," explains Prof. Gülşah Gabriel, Head of the HPI research department "Viral Zoonoses - One Health" and Professor at the University of Veterinary Medicine Hannover.

"These studies repeatedly show that pregnant women need special protection in epidemics and pandemics to protect themselves, but also the next generation," emphasizes Prof. Gülşah Gabriel the importance of the findings obtained in the study.

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Publication

Offspring born to influenza A virus infected pregnant mice have increased susceptibility to viral and bacterial infections in early life. Nature Communications, August 16, 2021.

<https://doi.org/10.1038/s41467-021-25220-3>

The HPI/TiHo-led study involved numerous scientific institutions, including the Imperial College London, the Helmholtz Zentrum München and the Research Center Borstel.

The results have been published in the journal Nature Communications:

Henning Jacobsen, Kerstin Walendy-Gnirß, Nilgün Tekin-Bubenheim, Nancy Mounogou Kouassi, Isabel Ben-Batalla, Nikolaus Berenbrok, Martin Wolff, Vinicius Pinho dos Reis, Martin Zickler, Lucas Scholl, Annette Gries, Hanna Jania, Andreas Kloetgen, Arne Düsedau, Gundula Pilnitz-Stolze, Aicha Jeridi, Ali Önder Yildirim, Helmut Fuchs, Valerie Gailus-Durner, Claudia Stoeger, Martin Hrabe de Angelis, Tatjana Manuylova, Karin Klingel, Fiona J. Culley, Jochen Behrends, Sonja Loges, Bianca Schneider, Susanne Krauss-Etschmann, Peter Openshaw and Gülşah Gabriel (2021). **Offspring born to influenza A virus infected pregnant mice have increased susceptibility to viral and bacterial infections in early life.** Nature Communications, August 16, 2021.

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Download the PDF of the press release: https://www.hpi-hamburg.de/en/current-topics/press/singleview/archive/2021/article/influenza-in-der-schwangerschaft-beguenstigt-erhoehte-infektanfelligkeit-der-nachkommen/?tx_ttnews%5Bmonth%5D=08&cHash=167939c460b70837f69c364849b2cf7e

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The Leibniz Institute for Experimental Virology (HPI) conducts research into human pathogenic viruses with the aim of understanding virus-related diseases and developing new therapeutic approaches.

On the basis of basic experimental research, new starting points for improved procedures for the treatment of viral diseases such as AIDS, influenza and hepatitis, but also of emerging viral infections, are to be developed. With its main research areas, HPI covers the world's most important viral infectious agents.

Founded in 1948, the institute's origins go back to the patron Philipp F. Reemtsma and the neurologist Heinrich Pette. As a foundation under civil law, HPI is a non-profit and independent research institution that has been a member of the Leibniz Association (WGL) since 1995. The institute is funded proportionally by the German Federal Ministry of Health (BMG) and the joint research funding of the federal states, represented by the Ministry of Science, Research, Equality and Districts (BWFGB) of the Free and Hanseatic City of Hamburg. In addition, a large proportion is obtained through competitive procedures.

More information: www.hpi-hamburg.de

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